

CLAIMS:

1. An optical input device based on movement of an object and the device relative to each other, which device comprises a module provided with a transparent window and accommodating at least one optical sensor unit including a laser having a laser cavity for generating a measuring beam, converging means for converging the measuring beam in an action plane and for converging measuring beam radiation reflected by the object in the laser cavity to generate a self-mixing effect in the laser and measuring means for measuring the result of the self-mixing effect, which effect is determined by said movement, characterized in that the converging means are adapted to provide a self-mixing effect that is smaller than a possible maximum but larger than a detection threshold for an extended range of distances between the object and the device window.
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2. An optical input device as claimed in claim 1, characterized in that the converging means is constituted by means, which converge boundary beam portions, central beam portion and intermediate beam portions, respectively in different axial positions.
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3. An optical input device as claimed in claim 2, characterized in that the converging means shows a predetermined amount of asphericity.
4. An optical input device as claimed in claim 2, characterized in that the converging means shows a predetermined amount of astigmatism.
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5. An optical input device as claimed in claim 2, characterized in that the converging means shows a predetermined amount of coma.
6. An optical input device as claimed in claim 1, 2, 3, 4, or 5, characterized in that the converging means are lens means.
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7. An optical input device as claimed in claim 1, 2, 3, 4 or 5, characterized in that the converging means are mirror means.

8. An optical input device as claimed in claim 1, 2, 3, 4, or 5, characterized in that the converging means are diffraction means.
- 5 9. An optical input device as claimed in any one of claims 1-8, characterized in that the converging means comprises at least one element, which covers the whole cross-section of the measuring beam.
10. 10. An optical input device as claimed in any one of claims 1-8, characterized in that the converging means comprises an array of converging elements, which are smaller than the cross-section of the measuring beam and together cover this cross-section.
11. 11. An optical input device as claimed in any one of claims 1-10, for measuring movements that includes at least a scroll action and a click action, characterized in that at 15 least one sensor unit measures both scroll action and click action and supplies a sensor signal to signal analysing means comprised in the measuring means and in that the signal analysing means comprises means for distinguishing a first signal time pattern, which is typically for a click action from a second signal time pattern, which is typically for a scroll action.
- 20 12. An optical input device as claimed in claim 11, characterized in that the signal analysing means comprises storage and/or delaying means for combining measurement results obtained at different time intervals.
13. 25. An optical input device as claimed in claim 11 or 12, characterized in that the said at least one sensor unit is activated by activation pulses and in that the analysing means is synchronised in time with the sensor unit such as to perform analysis during measuring time intervals, which are determined by the activation pulses.
14. 30. An optical input device as claimed in any one of claims 1-10, for measuring movements that includes at least a scroll action and a click action, characterized in that at least one sensor unit measures both scroll action and click action and comprises additional means, which allows establishing presence of the object on the device window.

15. An optical input device as claimed in claim 14, characterized in that the additional means are constituted by means for establishing whether the measuring beam reflected by the object comprises an amplitude component having lower frequencies than those caused by a scroll action.
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16. An optical input device as claimed in claim 15, characterized in that the additional means is constituted by a radiation-sensitive detector, which is arranged to receive measuring beam radiation that is non-incident on the laser cavity.
- 10 17. An optical input device as claimed in claim 15, characterized in that the additional means is constituted by electronic means for detecting said component in the output signal of the sensor unit.
- 15 18. A mobile phone apparatus comprising an optical input device as claimed in any one of claims 1-17.
19. A cordless phone apparatus comprising an input device as claimed in any one of claims 1-17.
- 20 20. A laptop computer comprising an input device as claimed in any one of claims 1-17.
- 25 21. A handheld computer comprising an input device as claimed in any one of claims 1-17.
22. A mouse for a desktop computer comprising an input device as claimed in any one of claims 1-17.
- 30 23. A keyboard for a desktop computer wherein an input device as claimed in any one of claims 1-17 is integrated.
24. A remote control for a TV set comprising an input device as claimed in any one of claims 1-17.

25. A pen comprising an input device as claimed in any one of claims 1-17.